

A COMPARISON OF THE TYPEWRITING ACHIEVEMENTS OF STUDENTS  
TRAINED ON THE "UNIVERSAL" AND THE "DVORAK-DEALEY  
SIMPLIFIED" TYPEWRITER KEYBOARDS

by

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## ACKNOWLEDGMENT

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It was through the untiring services of Mr. Wayne M. Haines that the keys on these machines were changed from the positions on the "universal" keyboard to those of the new keyboard.

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A COMPARISON OF THE TYPEWRITING ACHIEVEMENTS OF STUDENTS  
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SIMPLIFIED" TYPEWRITER KEYBOARDS

CHAPTER I. INTRODUCTION

There are from one half million to three quarter million people taking typewriting in the schools of the United States. Most of these people use the present universal keyboard and very few ever stop to study the effectiveness of the old keyboard. Just as in so many other things, "we just take them for granted and use them." So it is with the typewriter.

According to the latest occupational census of 1930 there are 36,050 male typists in the United States and 775,140 female, making a total of 811,190 people using the typewriter to earn a livelihood.

The above figures are great, it is true, but in addition to the above recorded users of the typewriter, there are a large number of persons who use the typewriter for their own personal use.

On the present universal keyboard the high school

student must take two semesters of typewriting in order to receive high school credit for his work. He does not make much progress under the very best of teaching, due to the inherent complexity of the keyboard. At the end of the first semester the student attains eighteen or twenty words per minute, and at the end of the second semester he should net approximately thirty words per minute. In order to learn to type at any real speed he must continue the study for another school year. This means the student puts in two years in high school in order to learn to typewrite and if he doubles his speed over the first year he makes only sixty words per minute. There are many who doubt that this is too much time required to master such a mechanical subject as typewriting.

A casual glance at the keyboard makes one wonder why the keys are placed as they are on the universal keyboard. Are they placed so as to secure a maximum achievement and a maximum speed with a minimum of effort both in learning and in teaching? There had been no change made in the location of the keys on the typewriter from 1873 to 1932. The arrangement of the keys meant nothing to Christopher Sholes and others who were working to develop the typewriter. Their paramount interest was to have every type bar hit upon a common center. The location of the keys meant nothing to them.

Having access to a new keyboard of 1932, the writer took the opportunity to make a study of the new system.



It is claimed that this new simplified keyboard completely removes the age-old, one might also say "shop-worn", trial and error method of teaching and learning to run a typewriter. It is claimed that it shortens the learning period by one-half of its original time. For this study four one-hour experimental classes were held daily at the University of Washington during the summer session of 1932. The results secured with these classes are the data of this thesis.

## CHAPTER II. HISTORY OF THE TYPEWRITER

The history of the typewriter dates back more than two hundred years. It is the result of efforts on the part of many men interested in perfecting printing machines. These men registered a great deal of dissatisfaction in the legibility of persons' hand writing, and saw the need of some device to write out peoples' thoughts more plainly and rapidly.

"In 1714 Henry Mill, the engineer of the New River Water Company, obtained a patent for a machine which he stated he had brought to perfection at great pains and expence, and the object of which was to impress letters on paper as in writing.

From 1714 to the present there have been 286 different writing machines invented.

In 1784 an embossing machine was invented in France.

In 1829 Mr. William Austin Burt took out the first American patent of which there is a record for what he called a "typographer". All these records were destroyed by a fire in 1836.

In 1833 Mr. Xavier Projean of Marseilles, France, invented a "Typographic machine or pen" which was the first to use typebars.

In 1844 Rev. W. Taylor exhibited a machine invented by Mr. Littledale. The object of this machine was to emboss the required letters for the use of the blind.

In 1845 in the United States, Charles Thurbar invented a machine using the same carriage principle that is used in the best typewriters in 1927. In this same year Dr. Leavitt of Kentucky invented a typewriter which was the first to have "differential spacing". The typewriter has progressed to this date as Progin had the first typebar and Thurbar had the carriage." (1)

"Between 1840 and 1860 Charles Wheatstone invented several typewriters which are now in the South Kensington Museum". (2)

"Between 1845 and 1867 numerous other writing machines were invented. That of Mr. Pratt of Alabama inspired the publishers of that day so as to arouse great interest in the typing machines. Pratt's machine was by far the most important and practicable machine which had appeared up to that date and it is owing to its appearance and the newspaper articles and discussions which it provoked that we

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1. History and Encyclopedia, Business Equipment Publishing Co. Reprint Edition from the October, 1932 issue of Typewriting Topics. The International Office Equipment Magazine. pp. 10.
  2. The New International Encyclopedia. Vol. XII. pp. 595.

owe the typewriter of today". (1)

"The key typewriter was first developed by three inventors of Milwaukee, Carlos Glidden, Samuel W. Soule and Christopher Latham Sholes. Sholes is the primary mover and central figure of the group and to him by general consent is accorded the distinction of having been the inventor of the first practical typewriter. In the course of time Soule dropped out of the enterprise, but Sholes and Glidden persevered and during the six years from 1867 to 1873 they built in succession from twenty-five to thirty different models, each a little better than its predecessor, but each showing some vital defect under the test of practical use." (2)

"After 1878 when the first machine was made that printed both small letters and capitals, the progress of typewriters was steady. Later Mr. Sholes sold his rights to the Remington Armoury at Ilion, New York, and since then the machine has been known as the Remington machine". (3)

"Probably the greatest limitations of the first typewriter was that it printed capital letters only. In 1878 the first Shift Key Typewriter, printing both capital and small letters was placed on the market. In 1880 James B. Hammond secured a patent for a writing machine built on

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1. History and Encyclopedia, Business Equipment Publishing Co. Reprint Edition from the October, 1932 issue of Typewriting Topics. The International Office Equipment Magazine. pp. 10.
  2. The New International Encyclopedia. Vol. XII. pp. 595.

the typewheel principle. The letters were arranged on a wheel in the center of the machine and when a key was depressed the wheel whirled until that corresponding letter came to the printing point and made its impression. This machine appeared on the market soon after." (1)

"Up to 1890 the type bar idea and the single shift keyboard, each bar carrying two type--upper and lower case, were in use. There was, however, no typewriter which had the very vital quality--visibility. It was not until 1896 when a German, Franz Wagner, came out with a visible writing machine. This afterward became known as the Underwood visible typewriter. This quality was soon adopted by all other makes because of its quick reacting movement.

Soon after the appearance of the Underwood on the market came the Royal typewriter." (2)

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1. The New International Encyclopedia. Vol XII. pp. 595
  2. History and Encyclopedia, Business Equipment Publishing Co. Reprint Edition from the October, 1932 issue of Typewriting Topics. The International Office Equipment Magazine. pp. 11.



## 2. PROGRESS IN COMMERCIAL EDUCATION

The Packard School, New York, N.Y. was the first business school founded in this country. It was founded in 1858 when James Buchanan was President. Abraham Lincoln was then a rising lawyer. The first Atlantic cable was just being laid. The student body of the school consisted of men only. In 1868 the typewriter was invented, and this made it interesting for women to enter the school. From 1870 to 1900 Business Education in this country was mostly in the hands of the private schools.

This school had itinerant teachers giving lessons in business studies and these led to the establishment of other business schools. It was not until the Twentieth Century that the High School began to feature business courses. Between 1900-1920 both private and High School Commercial departments flourished.

Prior to 1890 it was the general belief that commercial education should be secured in private schools, but since 1890 this handful of public secondary schools that offered commercial courses has grown to include almost all the high schools in the country.

When commercial subjects were first introduced into the secondary schools they were called "practical" courses and therefore inferior to the cultural subjects. Now they are classed as a real "art" by the Gregg Publishing Company.

The largest army in the world, 31,000,000 individuals

in our public schools, is trying through concentrated efforts to place our civilization on the highest levels ever reached. There were 30,000,000 students being trained in our schools by over 1,000,000 instructors at the cost of \$2,200,000,000 in 1931.

Commercial education may truly be regarded as a new element in the world. Commercial life is a new thing in the history of the race, and although modern commercial life is itself a new thing, commercial education is even newer and has considerable distance to go in order to catch up and retain its proper place. We are now at a turning point. Commercial education must supply captains of industry. These captains must be trained as truly as doctors and surgeons must be trained.

Many new studies and questions and problems are arising and appearing in current magazines which prove the vast interest and importance of the trend of commercial education. One of these is by C. L. Cushman: "Will Commercial Education seek to give youth a picture of the realities of business in relation to the whole plan of American Life? Since we must accept the thought that we live in an interdependent society we must accept a new philosophy of commercial education in which the primary objective becomes the training of pupils to evaluate business conduct in terms of its contribution to society as a whole." (1)

1. Cushman, C. L. Social Responsibilities of Commercial Education. Journal of Business Education, Vol VIII. September 1922. No. 1. pp 9.

Another article which shows the growing importance of this subject is by Harold H. Smith, in which he makes a study of typing errors and compares the diagnosis of typing with that of medicine.

"It seems to be the opinion of all those writing on this subject to believe that typewriting should be taught in the elementary schools. It was at first considered a subject for mature men and women, then it was introduced into the high schools and now they believe it would work very satisfactorily if typing were taught to grade school students." (1)

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1. Smith, Harold H. Diagnostic Testing and Remedial Teaching. Part I. The Gregg Publishing Co. Journal of Business Education Vol. VIII. September 1932. pp 11.



### 3. HISTORY OF THE TYPEWRITER KEYBOARD

There is nothing known regarding the writing machine of Henry Mills of 1714 except a description given in the Patent Study Primer.

"The machine of William Austin Burt of Detroit of 1829 carried type on the segment of a circle instead of an individual type bar. This was the original of the modern type-wheel machines.

The machine of Xavier Projean, a Frenchman, 1833, was based upon individual type bars set in a circle. When operated each type bar hit upon a common center. This was an important development in the history of the keyboard.

The patents granted to Charles Thurbar of Worcester, Mass. 1843-5 showed a decided advancement. The spacing of the letters was affected by the lengthwise motion of the platen. This principle is still used in modern machines.

Charles Glidden, Samuel W. Soule and Christopher Sholes, aided by James Densmore put out many trial machines between 1867 and 1873. These machines had some features which are still standard in present-day models. One of these features was that the type bars were so arranged that the type printed at a common center. These machines printed capital letters only.

In 1878 the first shift key typewriter, printing both capital and small letters was invented.

In 1880 James P. Hammond secured a patent for a writing machine built on the type-wheel principle. The letters were

arranged on a wheel in the center of the machine and when a key was depressed the wheel whirled until that corresponding letter came to the printing point and made its impression. These machines all had the common defect that the operator had to raise the carriage in order to see the line which was being written, due to the understruck principle.

The Horton Typewriter, 1883 was one of the earliest attempts to invent a visible writing machine. It used the direct stroke principle, that is, the type bars struck down on a common printing point on the top of the cylinder.

Franz X. Wagner, 1894, had a machine whose type bars were placed in a segment in front of the carriage, the type printing on the front of the cylinder. This machine wrote an entire line visible to the eye without moving the platen, very much like our present day typewriters. Both the three and four bank machines have the universal arrangements of letters, same as that used on the first typewriter.

"Nearly all writing machines on the market today are of the type bar variety. This construction involves all the sound principles of the original model of 1873. The steel type bars are so arranged that they print at a common center. The step by step escapement mechanism provides for spacing of letters. The paper is fed around a cylinder called a platen. A lever at the side moves the paper for line spacing and in most cases serves as a carriage return on most machines. The type bars are arranged in front of the carriage so that they strike on the front of the platen when the

corresponding keys are pressed. This is called the roll stroke. The arrangement of letters, on the typewriter keys has, with minor variations, been standard since the invention of the first writing machine. Both three and four bank keyboards have this universal arrangement of letters.

There is on most typewriters one row of figures. Special characters and punctuation marks are scattered on these keys. Usually there are 42 keys writing 84 characters. Another writes 92 characters with 46 keys, including eighths of fractions. Two other models have 38 keys and write 76 characters. It will be remembered that the arrangement of letters on the three bank machines is the same as that on the four bank variety. The difference is that there is no row of keys for numerals. The special characters and punctuation marks appear on the letter keys. The number of keys varies from 28 to 35." (1)

"In most modern typewriters each letter is produced separately, by actuating a separate device for each letter by means of a key on a keyboard. The construction may, or may not, be simplified by contriving that one key shall be available for more than one letter. Each key is marked so as to indicate the character or characters which can be printed by means of it; and as the keyboard is so arranged that those letters which are most frequently in use are nearest to one another, the operator has to "learn the keyboard" so that he may be able to strike the appropriate

keys without looking for them, before he can acquire high speed of manipulation." (1)

The typewriting keys have been arranged as they are since the first writing machine was invented. Never was a thought given to the rearranging of the keys on the keyboard until 1932.

In 1932 Dr. August Dvorak of the Education Department of the University of Washington took out patents on a new and more scientific typewriting keyboard. He had made a thorough study of the arrangement of letters on the keyboard considering the most frequently struck keys, the elimination of so many unnecessary hurdles, the cutting down of fatigue, a keyboard which could be more easily learned and used with better rhythm, and a lessening of errors because of a more natural sequence of two and three letter digraphs.

Figure 1 shows the location of the keys on the "universal" keyboard. Figure 2 shows the location of keys on the new 1932 keyboard. There are three keys, the position of which have not been changed. They are the letters "a", "z" and "m". It is seen that all the vowels are on the left hand on the home row, and the most frequently used other keys appear on the home row of the right hand.

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1. Funk & Wagnalls, New Standard Encyclopedia. Vol XXIV pp 119.

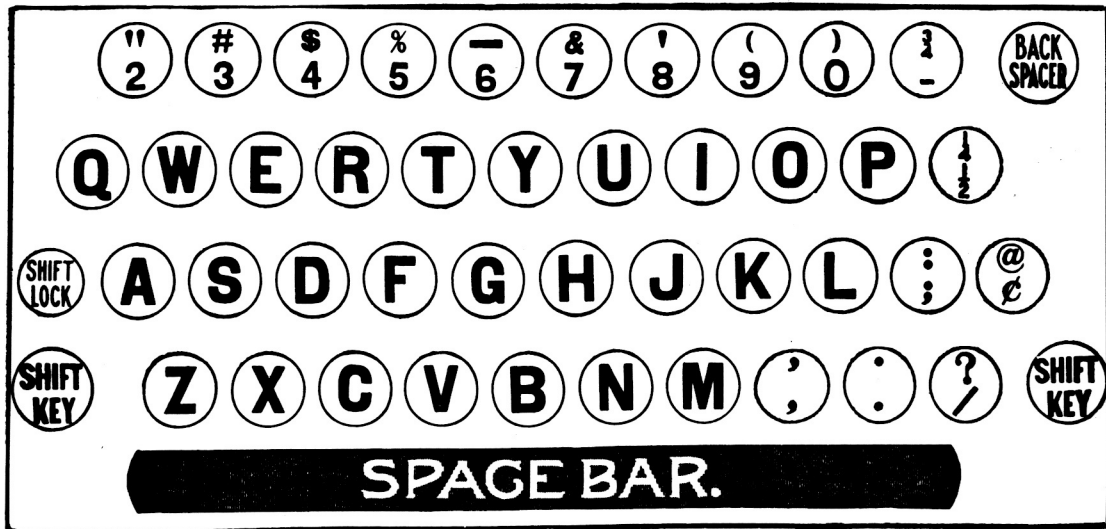


Figure 1. Arrangement of keys on the "universal" typewriting keyboard.

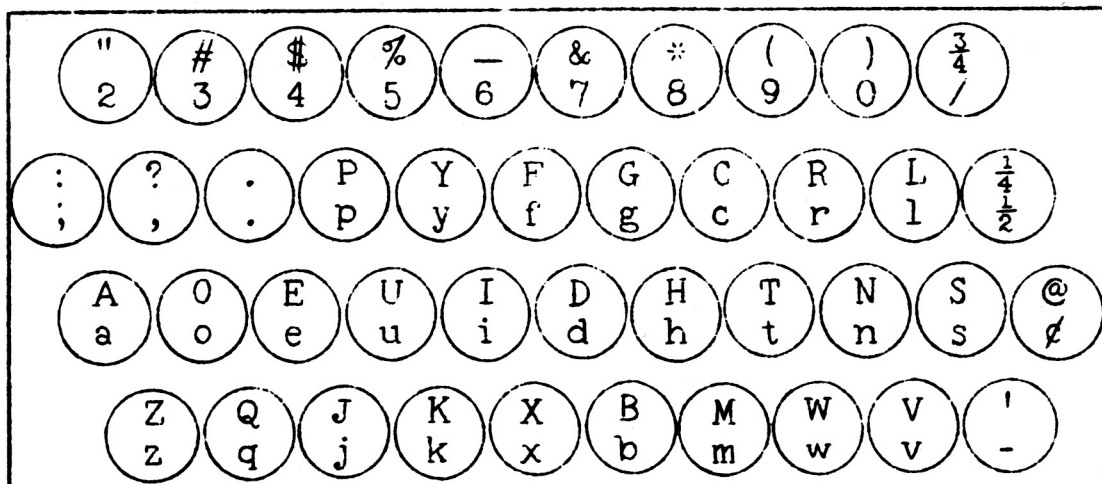


Figure 2. Arrangement of keys on the new 1932 typewriting keyboard.

### CHAPTER III. PURPOSE, METHOD AND MATERIAL OF THIS STUDY

#### 1. PURPOSE.

The first purpose of this experiment was a comparison of attainment of students using the new and old keyboards. This new keyboard has for its general objects: (1) the provision of a scientific plan of arranging the keys which will decrease the possibility of typewriting errors, (2) facilitating increase of operating speed by eliminating awkward sequences, (3) assisting increase of speed because of fewer errors and because of decreased finger motion, (4) lessening the fatigue of the typist because of fewer interruptions due to errors because of better arrangement of the keys for typing the sequences most frequently used, and the rhythmical flow of typing induced thereby, and because of more evenly distributed labor for the individual fingers and the two hands.

The general objects of this new simplified keyboard may be summed up by saying that the inventor, (having in mind the letter-sequences found in the most commonly used words of a language) desired to produce such an arrangement of the keys that the automatic rhythm of the operator,

passing from one key to another in a continuous flow of word-wholes and phrase-wholes best fits the mechanical rhythm of the typewriter.

A second purpose of this experiment was to determine what the effect the new keyboard would have on speed and errors. Previous attempts to improve the present so-called "universal" keyboard have been confined, so far as we are aware, either to arbitrary rearrangements of letter-keys; without regard to their relationship to all other keys, or to studies of the tapping of isolated letter-keys and the counting of isolated finger loads and isolated letter errors. Successful typing is the more or relaxed following, by the typist, of letter sequences (word patterns) with the typewriter. A keyboard arrangement must be based upon the requirements of the sequential stroking, the even uninterrupted flow of which we can designate "rhythm".

The rhythmical flow of complete sequences may be momentarily checked by an error. A single key stroke is felt chiefly, if at all, as such a misdirected stroke or error that temporarily blocks the rhythm of typing patterns. Errors are to be attacked only in their original line or phrase or word or shorter sequence setting. This is further shown in the fact that most false strokes are clean, effective strokes to the wrong keys. The more dominant digraphs appear to hold down errors and facilitate speed despite handicaps of the present haphazard keyboard.



The third purpose was to compare the ease of typing on the new keyboard with that of the old. A more even distribution of loads among fingers of both hands made a greater ease of writing possible. Since every syllable must have a vowel, the new keyboard concentrates the vowels in the left hand. This makes it necessary for each hand to be put in use in every syllable rather than to have one hand carry the load through an entire word as in sad, greater, reader, ease, minimum, date, as written on the old keyboard. Also the common punctuation marks and the least used consonants are placed on the left hand.

The fourth purpose was to show a comparison of reduction in fatigue while writing on the new keyboard from that of performance on the old keyboard. The elimination of so much wasteful hurdling by having the most common English sequences appear on the home row, should be found to be a great energy saver for the typists in this class. Those who had learned to type on the old keyboard and had transferred to the new should show a decided higher accomplishment with less fatigue when using the new than when using the old keyboard.

A study of the arrangement of keys on Figure 1 and Figure 2 in typing such common words as the, and, greater, and date, will show why greater speed and accuracy can be attained with more ease and less fatigue by using the arrangement of keys on Figure 2.



## 2. METHOD

This experiment was conducted during the summer session of 1932 at the University of Washington. Classes were held daily at 8, 9, 10, and 11 o'clock. Each class worked for fifty minutes.

There was no segregation made of students. They were permitted to take any hour which was most convenient to the student. Junior High School, Senior High School, Adult and University students and "Relearners" worked together during all the four hours. The relearners were allowed to sit among the slower students. The writer would make a segregation here if this experiment were to be run again. It is the belief of the writer that the proximity of beginning students to the fast clicking of keys of typewriters on which relearners were writing tended to slow up the beginning students. This was evidenced very pronouncedly in the fact that in two cases where boys sat next to relearners, these boys made the lowest scores of anyone in the class. They both claimed that they were conscious of the speed of the other machines. Each of the boys dropped out weeks before the course was terminated.

Each student made a pattern of the keyboard. This showed which fingers should be used on the different keys. The students proceeded to memorize this pattern. They were taught the touch method; to work from the "home" row; and

to stroke quickly. Rhythm was stressed. All papers were corrected and returned to the students. The instructor who started all the classes believed in building up from the third and fourth (and at the same time weaker) fingers of each hand. Most present day typing instruction books start with the "home" row, or with the first and second finger of each hand. These are the stronger fingers so should not require as much attention as the third and fourth fingers.

From past experience in teaching typing the writer finds that students of typing like to start out using the third and fourth fingers because they learn the hardest part of typing first, when there is still a thrill in learning, then proceed to the easier fingers. Their progress seems greater, thus giving them more encouragement. A natural lag is encountered when going from the easier to the harder.

Two instructors taught the four classes. One instructor started all four classes, and continued the teaching for two weeks, with the assistance of the other teacher. Then each instructor took charge for two hours, one took the first two hours and the other the second two hours. Each had complete charge of her group from the end of the second week through the course. Each corrected the papers of her group and each recorded the results of testing given her group.

The students worked on exercises the first week, and

were given new exercises throughout the nine weeks. They were tested at the end of the first week, and every week thereafter. One minute tests were given daily on familiar material for motivation. Five and ten minute tests were often given on familiar material. Tests were given once a week on new material, the results of which were recorded. All tests were scored according to the International Contest Rules.

### 3. MATERIAL

Notices were sent out to principals of Junior and Senior High Schools in the city of Seattle informing them that experimental classes in typewriting on the new Dvorak-Dealey Simplified Keyboard were to be held at the University of Washington during the summer of 1932. Notices in the University of Washington Daily invited college students to attend. Students desiring to learn typewriting on the new keyboard were invited to attend a preliminary meeting on June 17.

It was made very clear to the students that this was an experiment, that they were not to expect credit for the work as no such arrangements had been made, and that they could not go on with Typewriting II in High School if they finished High School Typing requirements in the experimental classes.

On the morning of the meeting there were so many students, Junior High School, Senior High School, College students and adults who were not attending any school, that a problem of accommodating the students with machines arose. It was decided that the first present on the morning of classes were to have the typewriters.

Thirty-three Underwood Standard typewriters were used. These were all rebuilt machines which were furnished by the University Book Store and the University Mimeograph Company. The keys were removed from the old positions and bent to fit

in new locations. This gave the typewriters a very uneven touch.

There were available four tables, temporarily constructed, each accommodating eight machines. The extra typewriters were placed on ordinary classroom tables. Regular chairs were used. No effort was made to line up the height of the chairs with the tables from a good typing position standpoint. This did not add to the success of the students.

There were 132 students in all at the beginning of the course. Of the writer's half (sixty-six) work records were obtained on fifty students; twenty-six Junior High School, Seven Senior High School, five Relearners and twelve adult and University of Washington students. This study covers the records of the fifty students in the writer's group. Farther on in the study the reasons are given for the sixteen dropouts.

Since the method of teaching and the keyboard differed from the usual methods of teaching found in the ordinary typing texts for the "universal" keyboard, the writer had to write her own teaching material. The Aye<sup>o</sup> List of 1000 most commonly used words was used. Five original tests were written all of which appear later in this study. Lesson sheets were written, which also appear later. Other testing material from the various typewriter companies which was used is also shown later.

## CHAPTER IV. THE EXPERIMENT

Out of the writer's sixty-six students who started the course fifty work records were obtained from twenty six Junior High School, seven Senior High School, five Relearners, and twelve Adult and University of Washington students.

There were many reasons for dropouts. Five started with much enthusiasm but dropped out because the classes interfered with their summer play, which was fair enough. Two dropped out because of illness, either their own or members of the family. Four left because they did not have proper clothes to wear. It was a very cool summer, and very wet. Times were hard and many parents could not let the students come because all they had to wear on their feet was tennis shoes. In an ordinary warm summer these would have been satisfactory, but not in all the cold rain of the summer of 1932. The room was on the sunny side of the building and only a few times during the summer did the heat of the sun seem too warm. One student moved out of town, two left on extended auto trips and did not return. One girl quit because her music was being neglected, and one

boy had to put in all his time on a swimming match which he won. This accounts for the sixteen students who dropped out of the writer's sixty-six.

The first sheet of practice material used is shown on Page 26. This was kept at the side of the typewriter while the student wrote from it. The picture of the keyboard was put on the top of the sheet so the student would have to use the touch method in writing, and yet he had a keyboard pattern in front of his eyes. Most of the students finished this exercise the first day. This showed that the learning of the placing of the keys must have been an easy task, which naturally would make it easier to remember the location of the keys. It will be noted that these exercises cover the keys struck by the fourth finger of each hand. Then the third finger of each hand was introduced. Lesson Two shows two-letter digraphs, some making words, which were used on both third and fourth fingers on both hands. Lesson Two B was introduced to aid the slower students. In it there is not such a change in letters from one line to the other as appears in Lesson Two. This entire sheet was used as a warming-up exercise throughout the course.

On Pages 27, 28, 29 are shown the other eighteen lessons written and used for practice material for first four weeks. Lesson III takes up real three, four, five and six letter words. Lesson V introduces words written into phrases. The exercises continued as the students added new



## LESSON ONE

Margin stops 10 and 70. Do not look at keyboard. Keep eyes on copy beside machines. Concentrate on rhythm by writing smoothly and evenly.

;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az  
;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az ;az

ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/  
ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/ ls/

,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq  
,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq ,eq

## LESSON TWO

An or on ar ll as no al av so oo ro ls rs lo ss os sa ol  
rn ns n/ rr nl nn ls na rl oz qa za va vs ls sl sr rn za

an or on ar ll as nl sl av so oo ro ls rs lo ss os sa ol  
rn ns n/ rr nl nn ls na rl oz qa za va vs ls sl sr rn za

ro za rn sr sl sa va za qa oz rl na ls nn nl rr n/ ns rn  
ov ol sa os ss lo rs ls ro oo so av al no as ll ar on or

ro za rn sr sl sa vs va za qa oz rl na ls nn nl rr n/ ns  
ov ol sa os ss lo rs ls ro oo so av al no as ll ar on or

## LESSON TWO B

an ar as al av az aq ao or ol on os oa oz oq ov za qa qs  
an ar as al av az aq ao or ol on os oa oz oq ov za qa qs

ra ro rl rn rs rv rq la lo lr ls ln lv na no nr nl ns n/  
ra ro rl rn rs rv rq la lo lr ls ln lv na no nr nl ns n/

ar ro ol os sa al lr rn na as so on ns sl lo oz za aq qo  
ar ro ol os sa al lr rn na as so on ns sl lo oz za aq qo

or ra an nl lo on nr rs so ol la as sn na av vo oa al ln  
or ra an nl lo on nr rs so ol la as sn na av vo oa al ln



## LESSON THREE

Set margins at 10 and 70

Word drill on third and fourth fingers. Please keep eyes on copy along side machine. Concentrate on rhythm.

son none lone lane nose rose sore lore bare an, or; nasal  
son none lone lane nose rose sore lore bare an, or; nasal

valor ravel savor arson snarl Larson Lora Nora snore razor  
valor ravel savor arson snarl Larson Lora Nora snore razor

## LESSON FOUR

an, or; on, ar; ll, as; no, al; av, so; oo, ro; ls, rs;  
an, or; on, ar; ll, as; no, al; av, so; oo, ro; ls, rs;

ro; za, rn; ar, sl; sa, va; za, qa; oz, rl; na, ls; nn,  
ro; za, rn; ar, sl; sa, va; za, qa; oz, rl; na, ls; nn,

aeui dhtns aeui dhtns aeui dhtns aeui dhtns aeui dhtns  
aeui dhtns aeui dhtns aeui dhtns aeui dhtns aeui dhtns

snthd iueoa snthd iueoa snthd iueoa snthd iueoa snthd iueoa  
snthd iueoa snthd iueoa snthd iueoa snthd iueoa snthd iueoa

## LESSON FIVE

and the their, and the their; and the their, and the their;  
and the their, and the their; and the their, and the their;

add and aid the lad; he said adieu, then died; the lad is  
add and aid the lad; he said adieu, then died; the lad is

the lad had tea in the den, then ran; these sons are true;  
the lad had tea in the den, then ran; these sons are true;

he sat; she ran; she sat; he ran; they ran; they run; it is,  
he sat; she ran; she sat; he ran; they ran; they run; it is,

## LESSON SIX

sit still to do it; stand still and do it; then shut the door  
sit still to do it; stand still and do it; then shut the door

the sheet is not there; the tie is too thin; she told her to  
the sheet is not there; the tie is too thin; she told her to

to dine in the hall; the stunt is too hard; the tie is too  
to dine in the hall; the stunt is too hard; the tie is too

# LESSON SEVEN

## SET MARGINS AT 10 and 70

The date is not set. Then that lad sent the letter to her.  
The date is not set. Then that lad sent the letter to her.

He aided the lad in his serious suit to rule at the initiation.  
He aided the lad in his serious suit to rule at the initiation.

It is indeed thin. I dare not do it; it is not set. He dares.  
It is indeed thin. I dare not do it; it is not set. He dares.

He did endure the test. He had one thousand neat ideas. I do.  
He did endure the test. He had one thousand neat ideas. I do.

# LESSON EIGHT

The nurse eases the lad's pains. The date is set to hear him.  
The nurse eases the lad's pains. The date is set to hear him.

That lad sent the letter to her. It is indeed not thin. I do  
That lad sent the letter to her. It is indeed not thin. I do

That lad did not endure the test. I dared her to do it.  
That lad did not endure the test. I dared her to do it.

He ate the dish of dates. Their son is on a diet. I shall  
He ate the dish of dates. Their son is on a diet. I shall

# LESSON NINE

Nine dishes are done. The estate is at hand. The lad is not  
Nine dishes are done. The estate is at hand. The lad is not

To detain is to err. He is not a heathen. He has a hoe.  
To detain is to err. He is not a heathen. He has a hoe.

Hollie has on her hood, not her hat. Did he have it in his  
Hollie has on her hood, not her hat. Did he have it in his

# LESSON TEN

Hasten the issue, so it shall arrive there in time to aid the  
Hasten the issue, so it shall arrive there in time to aid the

The nation needs our assistance in the dedication of the statue  
The nation needs our assistance in the dedication of the statue

The dust in the east causes disease in the head. Is that true?  
The dust in the east causes disease in the head. Is that true?

## LESSON ELEVEN

I can not do this thing. I shall do it gladly. The girl ran.  
 I can not do this thing. I shall do it gladly. The girl ran.

The cat ran into the house as the dog chased her through.  
 The cat ran into the house as the dog chased her through.

The noise ceased as the teacher called the roll early in the day.  
 The noise ceased as the teacher called the roll early in the day.

## LESSON TWELVE

The calf and the cat fooled around the yard the livelong day.  
 The calf and the cat fooled around the yard the livelong day.

The cat ate the goldfish and then ran out of the house in haste.  
 The cat ate the goldfish and then ran out of the house in haste.

He caught the dog around the leg as he tried to leave the yard.  
 He caught the dog around the leg as he tried to leave the yard.

She found her ring outside of her ring container as she left.  
 She found her ring outside of her ring container as she left.

## LESSON THIRTEEN

The cow was not large enough to sell so the owner had to wait.  
 The cow was not large enough to sell so the owner had to wait.

The waste was too great for the old fellow to stand so he left.  
 The waste was too great for the old fellow to stand so he left.

Her wages were not sufficient so she went out to secure more.  
 Her wages were not sufficient so she went out to secure more.

Are you going to the show with us tonight? I should say not.  
 Are you going to the show with us tonight? I should say not.

## LESSON FOURTEEN

The man gave a speech but we did not hear him, for we were late.  
 The man gave a speech but we did not hear him, for we were late.

By the way, are you going to our show in the house by the lake?  
 By the way, are you going to our show in the house by the lake?

Bill will soon be here, providing he can get his pay from the bank.  
 Bill will soon be here, providing he can get his pay from the bank.

## LESSON FIFTEEN

The bear went over the mountain to see what he could see, and the other side of the mountain was all that he could see.

Dear Sir: We are in receipt of your letter of yesterday's date and wish to inform you that we are out of the goods for which you asked. Thank you very much for your inquiry. Yours truly.

## LESSON SIXTEEN

The strawberry jam is now good to eat. Please give it to our little children. They will enjoy it very much, I know. The aged uncle had a young niece who had blonde hair. But the blonde hair was not a natural color. It was dyed. However the aged uncle knew nothing regarding this hair.

## LESSON SEVENTEEN

Dear Jack: This is a bright day in July and we are having a nice time at school. We are taking typing and progressing very rapidly. Soon I shall be able to write at a good rate of speed. I am trying to win one of the gold prizes which are being offered for accomplishment. If I keep on at the good rate at which I am now going I shall be able to write and tell you just what I won. I shall close now. Good night.

## LESSON EIGHTEEN

May we hear from you? The day is long. It is too bad. They went together; neither went alone. It was nice of you. We have no more of that goods. Please answer soon. We are. May we hear from your firm soon? We await your reply. Your immediate reply will be appreciated very much by us.

letters to their knowledge of the keyboard. Accuracy was always stressed.

Preliminary work on the above exercises was continued from June 19 until July 1, when the first five minute test was given. Results of this test were astonishing. The largest number of students made fourteen gross words per minute. Many of the net words per minute were reduced by errors. To anyone familiar with the teaching of typing it is evident that the first test is usually high in errors due to nervousness and physiological tightening of the muscles. Some of the results of this test show:

	G	N	E
Junior High School girl.....	13	13	0
Adult University of Washington Freshman.....	18	14	2
Senior High School girl.....	18	18	0
Adult relearner.....	37	34	3

Although these are the best selected from each group, they are very exceptional records. None of these students had ever practiced on this keyboard before, and all but the relearners were beginners in typing.

Test 1 on page 32 shows the material on which the first test was taken on July 1.

---

The one lad sat on the street and tied the too thin linen	57
to his hat. He said to the other lad that he heard the	112
horn sound, then he ran into shelter. He had stolen the	168
too thin linen and did not have the nerve to sit still.	223
The other lad had not stolen the too thin linen so he sat	280
still and later had tea alone in the den. As he entered	336
the den he shut the door. There he sat until the other	391
lad ran to this one and they entered the hall. These sons	449
are not true.	462

---

Test 1. First Typing Test Given to Students on July 1, 1932.

Note the size of some of these words as "linen" "sound" "shelter" "stolen" "entered", also the length of the test.

Since the smaller and weaker fingers were stressed first in teaching this course, none of the present text books could be used, consequently the teacher in charge had to make up the material. All the lesson sheets were made from the list of Ayer's 1000 most commonly used words and to give a chance to practice all the keys. The students were given words and sentences to write on the first week. This work was really too easy for most of the students which was evidenced by the fact that they continuously asked for new and harder material. The following three more tests were written.



He died so there is an estate to settle. They all dared her 60  
 to settle it on that day. He aided her in her serious suit. 120  
 She said she dare not do it on that day. So she sent a latter 182  
 to the lad to endure the test one day. That lad did not 238  
 endure the test as he had one thousand neat ideas on the dare. 300  
 She sent another letter to the lad. Later he did endure the 359  
 test and sent her a letter. The letter is indeed not thin. 418  
 The date is set. The lad had his hat in his hand and aided 477  
 her out the door. He adheres to the one thousand rules quite 538  
 a lot. The lad said that to detain is to err. They then set 599  
 the date to hasten the issue. 628

---

Test 2. Second "New Material" Test Given, Results of Which  
 Were Recorded for Second Week.

---

She sent a latter to the lad to tell the lady to enter the 58  
 hall as it is still not too late to enter. She had heard 115  
 of the death and the estate that had to be settled. She 171  
 had to attend. She had her hat in her hand as she entered 229  
 the hall. The lad tried to attend to and adhere to the one 288  
 thousand rules as she entered. The estate is not yet 341  
 settled as the door is not shut. It is still too late in 398  
 the day to attend to the duties, nearly too late to endure 456  
 the test. The lady and lad then had tea alone at a late 512  
 hour. The estate is not settled. As the lad aided her out 571  
 the door he had his hat in his hand. The day is over. The 630  
 day is too short. The reason that the estate is not settled 690  
 is that the sheet is not there in the den. They had lost it. 751

---

Test 3. Third "New Material" Test Given, Which was Recorded.

---



---

As we sat on the porch on a cool summer evening we heard 56  
 noises. We wondered what it was all about so we began to look 119  
 around. In the backyard we could see a cat running around 178  
 with her hair standing on end. She seemed terribly frightened 240  
 about something. Soon we saw what it was. It was a dog. He 301  
 was running as hard as he also could run. We tried to help the 364  
 poor cat so the dog would not hurt her. We ran toward the cat 426  
 trying to catch her. The harder we ran the faster the dog 484  
 seemed to go. Our little brother soon caught the dog by his 544  
 collar and we then tied the dog up in the back yard. The poor 606  
 cat then came back to us and curled up on my sister's lap. 664

---

Test 4. Fourth "New Material" Test Given, Results of Which  
 Were Recorded For Fourth Week.

Other tests numbering from five on were written, but  
 used only for practice tests. Also other practice material was  
 written which was distributed among the students to be used  
 as they could fit it into their time. This material is shown  
 in the appendix.

The above four tests were first used for five minute  
 tests, as new material to the students. In other words, when  
 a student wrote on one of these tests, he had never seen it  
 before so had never had a chance to practice on it. It was the  
 result of each of these tests which is being used for this  
 study for the first four weeks.

Other tests were given daily. For example the second week two five minute tests were given on the material in test 1, which had been given the first week as new material. Then on Friday, the last day of the second week the students were given a one minute test on Test 1 and a five minute test on Test 2. This was the students' first contact with Test 2. The third week daily one minute and five minute tests were given on Test 1 and Test 2. Then on Friday a one minute test on Test 2 and a five minute test on Test 3 were given. This result was recorded and used in the averages, which are shown in later Tables and Figures. This procedure was continued through Test 4.

As new students entered the classes their lessons and tests were given in the above order. A new student in the third week would take Test 1 while regular students were writing on Test 3. The new students' record was counted in the averages of the first week and so on to make the listing of his results agree with the actual time spent in class.

The one minute tests were given to motivate and to make students more accustomed to taking tests. The one minute test results were very satisfactory, the most of them being written without error. The summation of these one minute tests gives the following results: There were 676 errors made in 683 one minute tests given which shows

an average of .9897 errors for each test, satisfactorily proving a low error average on the new keyboard. One of the relearners wrote 97 words perfect in a one minute test, which is 14 words per minute more than the same girl ever wrote on a one minute test on the "universal" keyboard, after taking Typing IV in High School. She did this the fifth week of her work on the new keyboard.

In the fifth week a new type of test material was introduced. In the past the students had written from nothing but typed or mimeographed copy, now they began to work from printed copy. This was quite different. The type on printed copy is much smaller and closer together. There are not as many strokes to a line so the student does not fill a complete line for which stops on the typewriter are set at sixty spaces. This was very confusing to the student. He had to learn to adjust himself to this new situation. This new situation caused the averages of the fifth week to come down in every case. But in every case they also went up the sixth week and continued to rise. If the writer could run this experiment again it would be her choice to introduce this printed test material in the second or third week instead of waiting until the fifth week. The students were kept on the easy tests for four weeks because of the past teaching experience of the writer. In her past years of experience students learning on the "universal" keyboard had never done so well. Such progress

had not been anticipated.

Students in High School start right in on printed exercises from the typing text books, and they get accustomed to the proper spacing and placing on their papers. These are very simple exercises, but they are printed. In this case, no printed material to meet the new keyboard situation was available so new lessons had to be made up for the first four weeks. Then the sudden change the fifth week. Typing students in High School classes during the fourth and fifth week of the first semester are working on very easy budget material. The Underwood test of May 1926 was used for measuring the typing performance at the end of the fifth week. This appears in the appendix with other tests which followed until the end of the course.

The average age of the twenty-six Junior High School students was fourteen years. Their average days' attendance was twenty-four. There were only two who attended forty-two days, one attended eleven days and one twelve days. Many of these Junior High School students left for weeks at a time to attend camping conventions with the Girl Scouts, then they would return to class. Some left every week end, being gone Friday and Monday, camping with relations. All this goes to show how much more irregular the attendance was during this summer session than a regular nine week session at school. The Intelligent Quotients were obtained

for twenty-five of the twenty-six students. They ranged from .87 to 1.27, with an average of 1.11. The average gross words per minute mounted from 12.46 in the first week to 35.25 in the ninth week. The average net words mounted from 2.77 in the first week to 28.00 in the ninth week. The average errors declined from 6.15 in the first week to 3.37 in the ninth week.

It is a very important question among our educators as to where typewriting shall be introduced into our school curriculum. In Seattle students may not now take typewriting until they get into the Sophomore year of High School. Spokane, Washington; Portland, Oregon; Los Angeles, California are some of the cities that are successfully teaching typewriting in Junior High Schools.

Junior High School curricula in Los Angeles commonly include ten or twenty weeks of typewriting, required of every pupil as one of the prevocational contacts which he must make. It's aim is to provide one of the units of contact on which to base an intelligent selection of a vocational interest. At least one additional semester is offered for those who in the ninth grade select the subject for general training with a vocational interest. At the end of this second semester they try to have pupils writing around forty or fifty words per minute. In New Jersey it is a two year course, when the students attain forty or fifty words per minute.

This experiment shows a very successful record for Junior High School students. The Junior High School students attained a Gross average of 35.25 and a net average of twenty-eight words per minute, on an average of twenty-four days' attendance. This compares well with the Gross average of 44.33 words per minute and a net of 38.83 words per minute on an average of thirty-eight days' attendance for the Senior High School group.

There were nine Junior High School students who received credit in Typing I and Five who received credit in Typing II in this course. There were two Senior High School students who received credit in Typing I and five who received credit in Typing II in this course. The above figures and findings tend to show that typing can very successfully be taught in the Junior High School.

Figure 3 shows the average words per minute for twenty-six Junior High School students, for nine weeks. All the Gross averages, net averages, and errors were figured for each week and charted. There is a constant rise from the first week to the fourth week, then a drop during the fifth week, then a constant and natural rise in both gross and net words per minute. The decline in errors throughout the nine weeks was continuous. The drop in both gross and net in the fifth week was not due to a rise in errors the fifth week. The writer attributes this drop to the change in writing and testing material. The change was from typed material to the printed International Contest material.



Figure 3- Curves of Average Gross, Net and Error Scores Made by Twenty Six Junior High School Students on New Keyboard

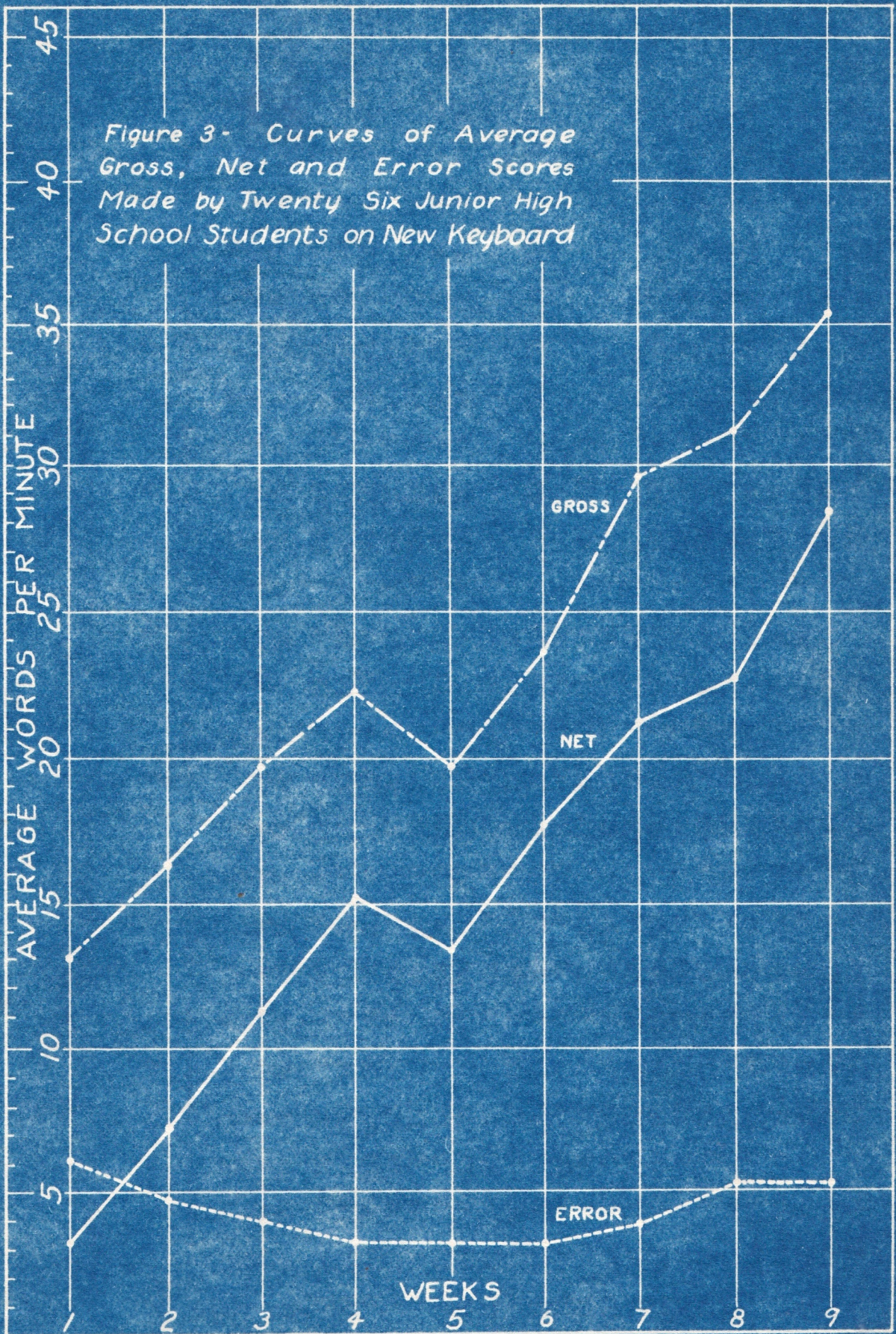




TABLE I

AVERAGE GROSS NET AND ERROR SCORES MADE BY TWENTY-SIX JUNIOR  
HIGH SCHOOL STUDENTS FOR EACH WEEK FOR NINE WEEKS

Weeks	1		2		3		4		5		6		7		8		9										
Students	Net	Errors	Net	Errors	Gross	Net	Errors	Gross	Net	Errors	Gross	Net	Errors	Gross	Net	Errors	Gross	Net	Errors								
1	14	0	11	8	23	12	6	28	8	9	16	3	7	22	12	5	22	11	6	26	12	7	7	33	30	1	6
2	14	6	4	2	20	14	3	29	21	4	20	16	2	28	26	2	31	27	2	32	28	7	7	33	30	1	6
3	14	0	10	6	18	10	4	17	9	4	18	6	6	23	13	5	35	21	7	35	15	8	8	38	26	6	6
4	12	0	14	4	22	10	6	26	20	3	23	12	5	36	19	8											
5	13	7	3	2	20	16	2	22	20	1	18	11	3	22	14	4	32	30	1	33	30	1	1	33	30	0	4
6	12	6	3	2	20	20	0	21	15	3	18	15	2	23	21	1	31	25	3	28	20	4	4	25	25	0	4
7	12	0	11	18	24	0	12	26	14	6	24	14	5	31	18	6	29	27	1	35	21	7	7	34	26	4	4
8	11	0	12	8	21	3	9	22	0	11	21	11	5														
9	11	0	6	5	21	10	5	25	12	6	20	12	4														
10	17	0	13	3	23	11	6	28	19	4	30	15	7	22	22	0	32	26	3	29	27	1	1				
11	7	0	6	3	8	8	0	11	4	3	8	0	1	16	12	2											
12	8	0	4	4	12	12	0	12	10	1	11	9	4														
13	15	5	5	7	24	18	3	21	19	1	24	16	9														
14	10	4	3	9	22	4	9	24	15	4	38	20	5	26	18	4	27	13	7								
15	14	0	7	10	23	13	5	21	21	0	18	9	5														
16	14	8	3	3	14	8	3	16	14	1	13	13	0	16	12	2	18	15	1								
17	12	0	6	8	20	8	6	20	6	7	21	13	4	25	3	11	27	13	7	29	19	5	5				
18	11	1	5	5	18	4	7	23	19	2	17	13	2	18	6	6	20	14	2	20	12	4	4				
19	13	1	6	2	21	21	0	21	19	1	24	22	1	24	24	0	28	28	0	31	21	5	5	34	32	1	1
20	13	13	0	0	23	19	2	30	24	3	24	16	4	27	23	2	25	17	4								
21	17	11	2	1	28	28	0	36	32	2	27	23	2	36	32	2	41	39	1	48	40	4	4	51	43	4	4
22	13	0	7	5	15	11	2	14	14	0	17	15	1	20	18	1	39	21	9								
23	7	0	4	1	14	8	3	14	14	0	11	7	2	13	11	1	16	10	3	23	9	7	7	23	10	5	5

TABLE I, CONTINUED

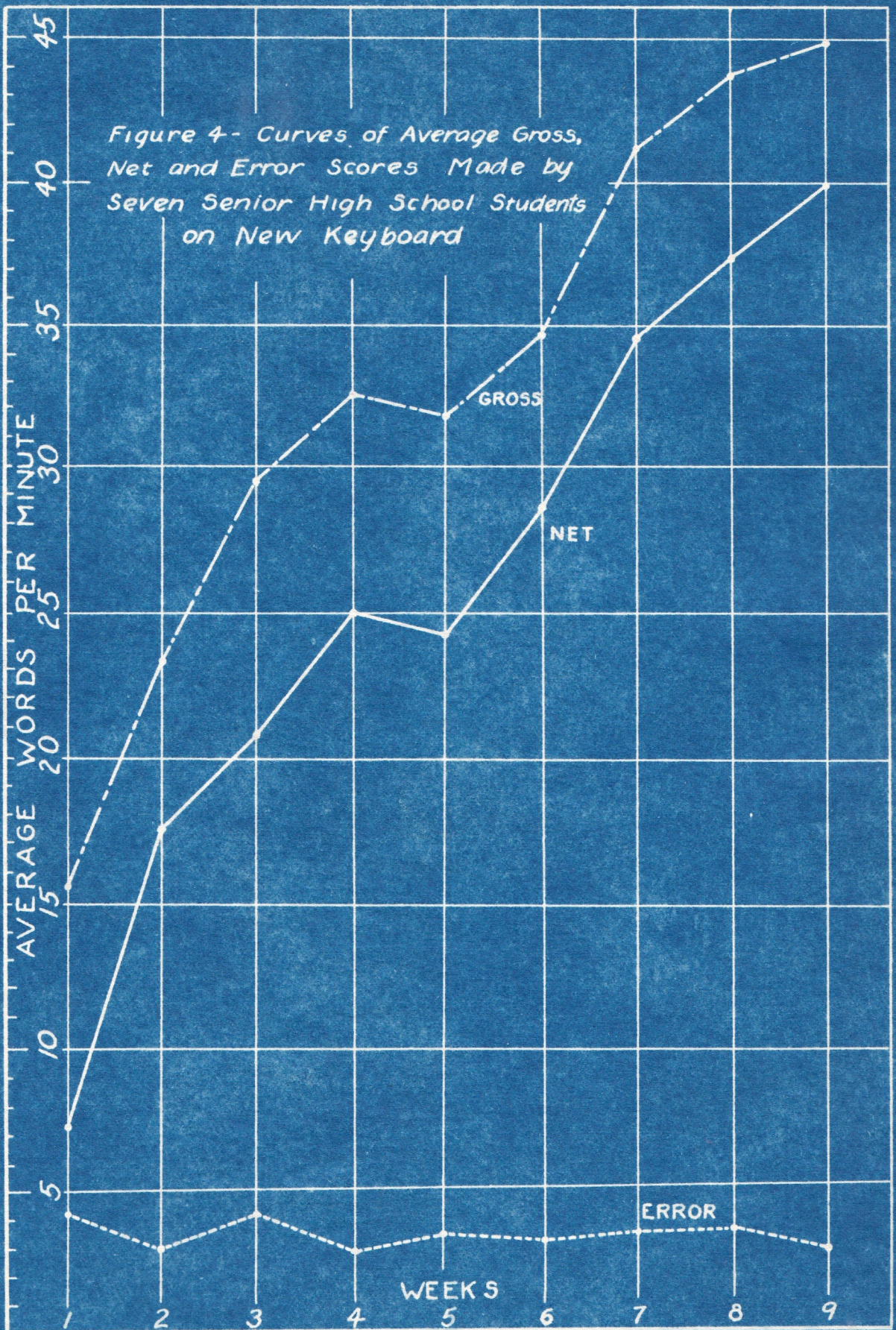
[illegible]

There were seven Senior High School students in the writer's group. Their ages ran from thirteen to sixteen with an average of fifteen; there were two who were present the entire forty-five days, and one who attended only eleven days in all. The average days' attendance was thirty-eight days. Intelligent Quotients obtained for five High School students ranged from 1.11 to 1.22 and averaged 1.18. The average gross words mounted from 15.71 the first week to 44.33 the ninth week. The average net ran from 7.28 to 38.83. Errors were cut down from an average of 4.14 in the first week to 2.66 the ninth week.

The same thing will be noted for the Senior High School students as was noted for the Junior High School students. There was a constant rise in both Gross and Net words per minute from the first to the fourth week. Then there was the drop the fifth week, and a constant, beautiful rise to the end of the ninth week. Errors in this group again had nothing to do with the drop in both Gross and Net words per minute the fifth week.



Figure 4- Curves of Average Gross,  
Net and Error Scores Made by  
Seven Senior High School Students  
on New Keyboard





AVERAGE CROSS NET AND ERROR SCORES MADE BY SEVEN SENIOR  
 HIGH SCHOOL STUDENTS FOR EACH WEEK FOR NINE WEEKS

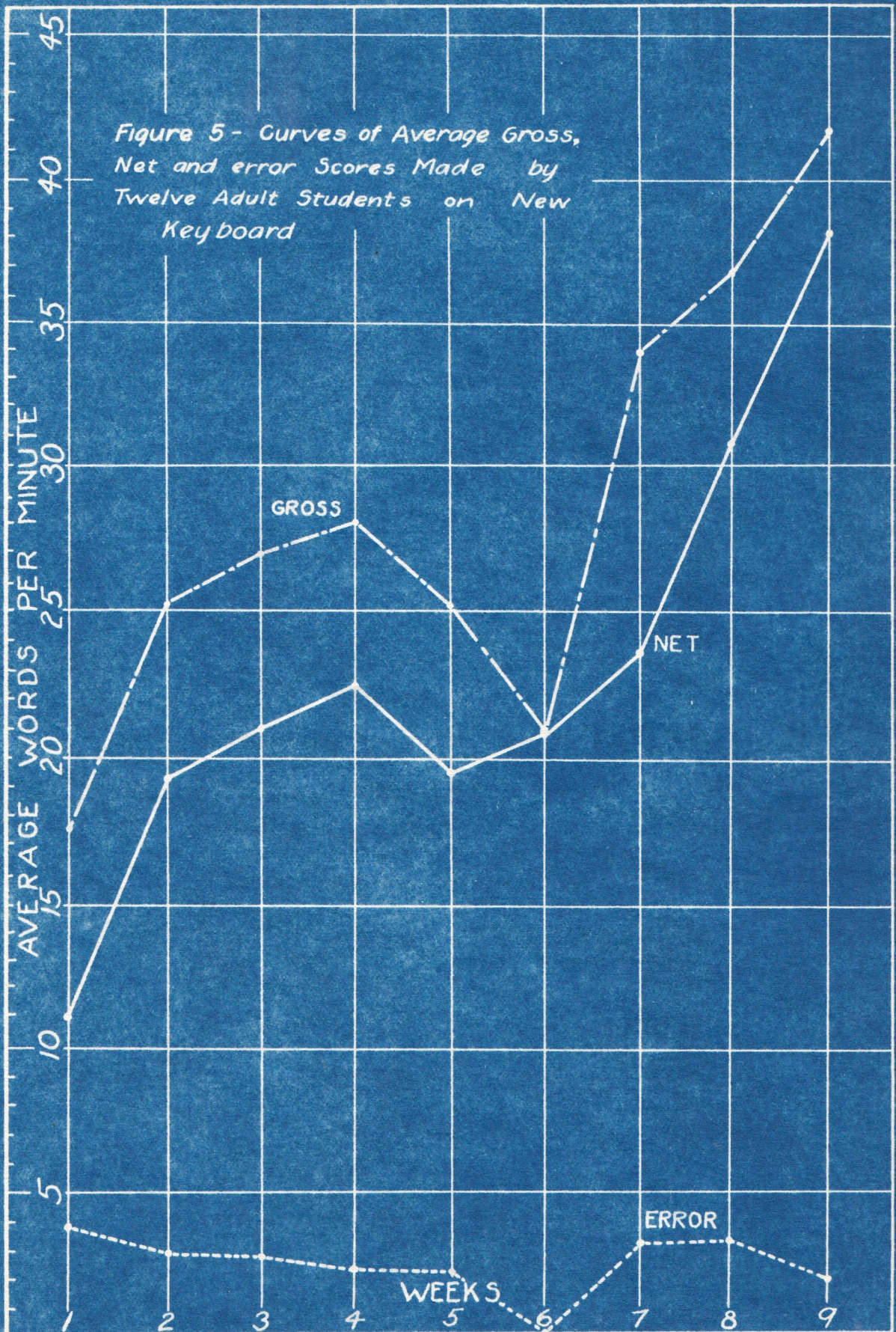
Авердес

There were twelve Adults in the writer's group. All of these were attending the University of Washington. One young woman attended forty-two days, and one only twelve days. The average days' attendance of this group was twenty-two days. Their ages ranged from twenty to thirty nine years. Most of these people were kept very busy with college work, so attended only when they could. Their gross words per minute ranged from 17.75 the first week to forty-two the ninth week. The average net words per minute ranged from 10.66 to twenty-eight. The errors decreased from 3.75 to 2.00. No Intelligence Quotients were obtained on these people.

These adults were beginners in typing. Their chart is not quite as regular as that of the younger students. Their school work made their attendance very irregular. Their chart shows a decline in average Gross in both fifth and sixth weeks, but a Net decrease only the fifth week, the same as the other groups had shown, then the Net started upwards, until it reached a net of thirty-eight words per minute.



Figure 5 - Curves of Average Gross,  
Net and error Scores Made by  
Twelve Adult Students on New  
Keyboard





AVERAGE GROSS NET AND ERROR SCORES MADE BY  
 TWELVE ADULTS FOR EACH WEEK FOR NINE WEEKS

Weeks	1	2	3	4	5	6	7	8	9
Students	1	2	3	4	5	6	7	8	9
Gross	10	14	22	15	22	22	36	35	42
Net	6	14	14	13	14	22	23	26	38
Errors	2	2	4	3	4	0	2	4	2
Gross	13	23	26	28	25	22	36	35	42
Net	9	13	20	20	19	22	23	26	38
Errors	2	2	3	3	3	0	2	4	2
Gross	31	35	33	39	25	22	36	35	42
Net	23	29	25	31	19	22	23	26	38
Errors	4	4	4	4	3	0	2	4	2
Gross	17	16	25	21	22	22	36	35	42
Net	1	8	13	15	14	22	23	26	38
Errors	8	6	6	6	3	0	2	4	2
Gross	14	18	14	18	22	22	36	35	42
Net	0	6	6	16	19	22	23	26	38
Errors	7	3	3	3	2	0	2	4	2
Gross	25	25	31	39	25	22	36	35	42
Net	19	19	25	35	19	22	23	26	38
Errors	3	2	3	2	1	0	2	4	2
Gross	22	27	37	45	25	22	36	35	42
Net	18	21	31	33	19	22	23	26	38
Errors	4	2	2	1	3	0	2	4	2
Gross	21	32	43	22	25	22	36	35	42
Net	13	28	40	20	17	22	23	26	38
Errors	3	4	1	2	1	0	2	4	2
Gross	20	55	22	19	19	22	36	35	42
Net	14	43	18	19	17	22	23	26	38
Errors	6	6	1	1	1	0	2	4	2
Gross	7	14	21	18	19	22	36	35	42
Net	0	12	19	16	17	22	23	26	38
Errors	0	0	1	1	1	0	2	4	2
Gross	15	18	17	37	31	21	32	39	42
Net	15	18	11	27	29	21	24	35	38
Errors	0	2	2	5	1	0	4	2	2
Gross	18	24	31	27	29	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	42
Net	10	22	27	27	29	21	24	35	38
Errors	4	4	2	2	1	0	4	2	2
Gross	18	24	31	37	31	21	32	39	4

The "relearner" group was very interesting. It took no more than one week in any case for the five students to transfer their control from the old to the new keyboard. Their ages ranged from nineteen to twenty-six with a twenty-three year average. The attendance of this group was better than others, an average of 39.8 days. All the relearners were given a test on the regular keyboard before starting on the new. The average results of these tests for the five relearners were 55.2 Gross; 48.4 Net; 3.4 errors. These figures show that not in one case did any of the relearners show as good a record on the old keyboard as they showed after transferring to the new, and after practicing only nine weeks. This would indicate the ease of transferring from the old to the new.

The relearner's Average Gross words per minute on the new keyboard ranged from 20.40 the first week to 66.66 the ninth week. The Net average ran from 16.20 the first week to 59.22 the ninth week. The question, "What about all these people who have learned to type on the old keyboard?" is answered most satisfactorily by the results of tests taken by these five relearners. The writer learned to use the new keyboard, and can now change from one type to the other with but little practice on each. The speed attainable on the new keyboard seems much greater than on the old.



Figure 6 - Curves of Average Gross, Net and Error Scores Made by Five "Relearners" on New Keyboard

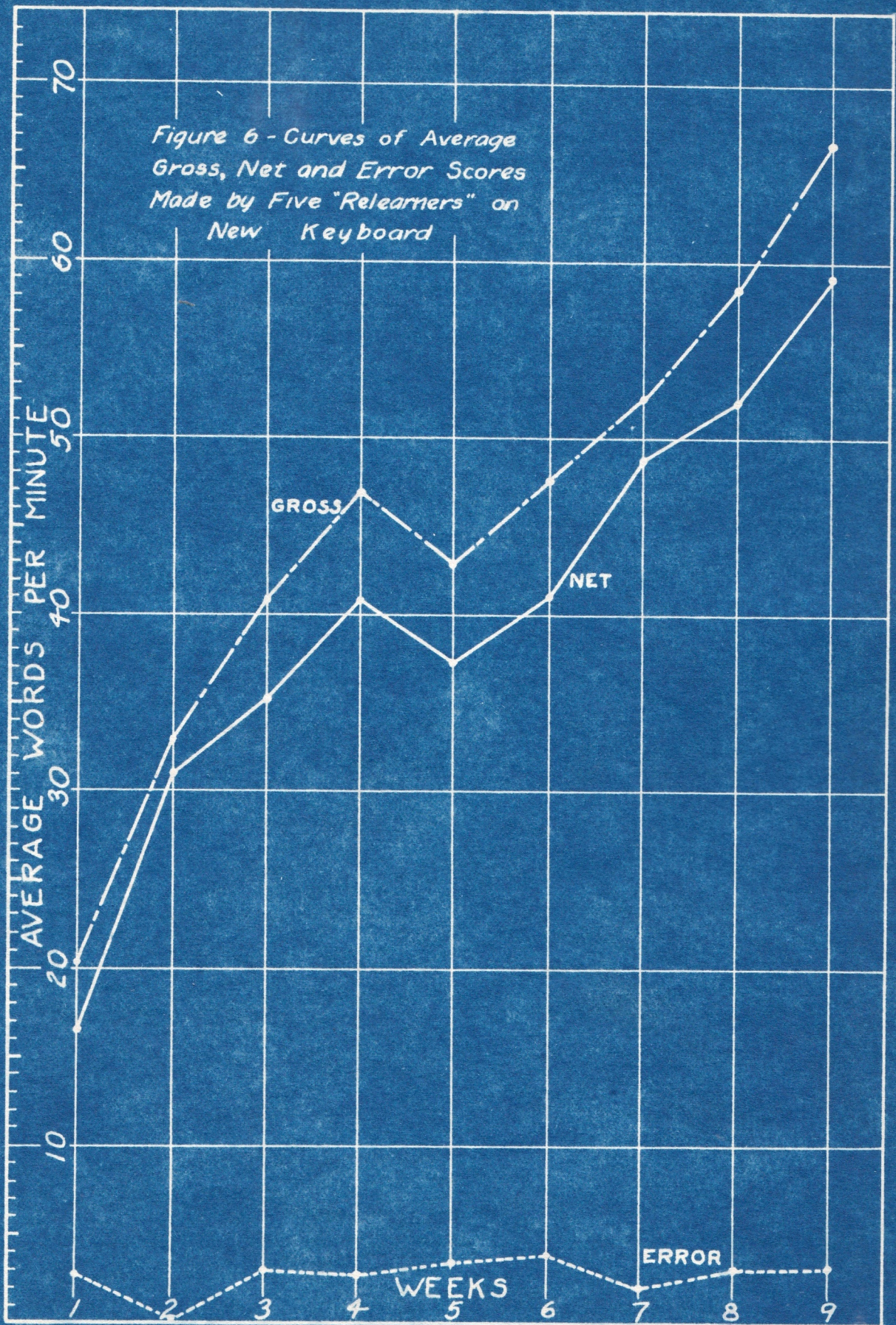




TABLE IV

AVERAGE GROSS NET AND ERROR SCORES MADE BY FIVE  
RELEARNERS FOR EACH WEEK FOR NINE WEEKS

Weeks	1	2	3	4	5	6	7	8	9
Students	Gross	Net	Errors	Gross	Net	Errors	Gross	Net	Errors
	Errors	Gross	Net	Gross	Net	Errors	Gross	Net	Errors
1	12	6	26	25	21	30	41	44	4
2	18	14	42	49	31	50	52	58	2
3	20	20	26	56	38	50	48	54	4
4	15	7	52	57	45	52	58	64	1
5	37	34	59	65	54	58	62	67	5
Averages	20.40	16.20	41.00	46.20	37.80	47.80	52.20	58.25	3.00
	2.40	31.40	24.60	40.80	43.40	41.20	48.20	52.00	59.33
	35.00	.0	34.60	3.20	3.20	3.20	5.40	66.66	3.66

It will be noted that in Figure 6 the relearners enjoyed a constant and fast rise in Gross and Net words per minute until the fifth week. They then dropped just as did the other groups in this same week. This almost proves conclusively that it was due to the change from the typed to the printed material. These relearners were kept on the same material the first four weeks as the other groups. After the fifth week they kept right on climbing upward to an average Gross and Net which exceeded their average Gross and Net on the "universal" keyboard by eleven Gross and eleven Net words per minute.

The following figures have been made available on the teaching of typewriting on the OLD KEYBOARD. The usual High School requirement for which a passing grade is given for ninety days' work is eighteen net words per minute, while the average High School attainment for ninety days is twenty-five net words per minute. The usual High School requirement for which a passing grade is given for 180 days' work is thirty net words per minute while the average High School attainment for 180 days is thirty-five net words per minute. It is a very unusual High School attainment when a student makes forty net words per minute in 180 days' work. The State Championship record for 1932 for 180 days' work was fifty-eight net words per minute, and that for 360 days' work was seventy-two net words per minute.

The results of the writer's experiment on the NEW KEYBOARD follow. The average attainment for the seven

Senior High School students for an average of thirty-eight hours of instruction was 38.83 Net words per minute; the average attainment for the twelve Adults and University of Washington students for twenty-two hours of instruction was 38.00 Net words per minute; the average attainment for the twenty-six Junior High School students for an average of twenty-four hours of instruction was 28.00 Net words per minute; and the average attainment for the five Re-learners for an average of 39.8 hours of instruction was 59.33 Net words per minute.

After varying portions of a forty-five day course, of seven Senior High School students, with an average of thirty-eight days' attendance four reached forty or more net words per minute, five reached thirty or more net words per minute, and seven reached twenty-five or more net words per minute. All seven of the Senior High School students reached passing attainments for ninety days. Five of the seven reached passing attainment for 180 days. Of the twenty-six Junior High School students with an average of twenty-four days' attendance, one reached forty or more net words per minute, five reached thirty or more net words per minute, nine reached twenty-five or more net words per minute, and fourteen reached eighteen or more net words per minute. Of the twenty-six Junior High School students fourteen reached passing attainment for ninety days and five reached passing attainment for 180 days. Of the twelve Adults of the writer's

group, with an average of twenty-two days' attendance six reached thirty or more net words per minute, seven reached twenty-five or more net words per minute and nine reached eighteen or more net words per minute. Of the twelve Adults nine reached passing attainment for ninety days and six reached passing attainment for 180 days.

Of the forty-five Junior High School, Senior High School and Adult students in the writer's group thirty reached passing attainment of eighteen net words per minute or more for ninety days, while sixteen reached passing attainment of thirty net words per minute or more which equals or exceeds the usual High School requirement for 180 days.

There are two Relearners who, in forty days, could have won the Washington State Championship for 1932, as compared with the above figures showing the winners at fifty-eight net words per minute. These two made sixty-three words per minute net, each.

Of the writer's group, on the NEW KEYBOARD:

Junior High School students averaged 1.17 net words per minute for every hour of practice. Senior High School students averaged 1.02 net words per minute for every hour of practice. Relearners averaged 1.49 net words per minute for every hour of practice. Adults and University of Washington students averaged 1.72 net words per minute for every hour of practice.



The Adult average of 1.72 is greater than that of 1.49 for the Relearners because of the fact that the Adults practiced an average of twenty-two days as compared with 39.8 days for the relearners. The usual High School attainment on the old keyboard is approximately .25 net words per minute for every hour of practice. This tremendous gain can be accounted for by the lessening of fatigue and hurdles.

During the same nine weeks of the same summer of 1932, there was a typewriting class conducted in Seattle for the Seattle Public Schools. Only High School students were enrolled as they worked for High School credit. These students worked on the "universal" keyboard. These students had typing books from which to work from the start of the course while the students in the experimental class had the "self-made" mimeographed and typed lesson sheets for the new keyboard students, which were used until the end of the fourth week.

The instructor in charge of the High School class kept a record of his best nine tests given in the last four weeks of the course. Each test was given on new and unpracticed material. Some days the instructor used three tests and took the best one of the three for his records. This instructor informed the writer that he emphasized accuracy more than speed. It is his belief that the students emphasize speed without being urged.

The students in this class took typing for two hours a day as the periods were two-hour periods. The instructor in

charge does not believe in having students type for such a long period as he believes fatigue sets in after about one and one-fourth or one and one-half hour of work and the last half or three quarters of an hour are practically wasted. Class attendance for the regular High School students was compulsory for two hours, while class attendance for the writer's classes was for one hour, and then not really compulsory as we had promised no grades if a certain attainment were reached. A good grade, of course, is always one of the rewards of any High School class.

The records of thirty-eight students were used in making the Figure 7 and Table V. There were forty-five students in the High School class, but seven of them were repeating the course. The writer could not have had any who were repeating the course since no one could have practiced on the new keyboard prior to the first day of the class, there being no typewriters available with the new keyboard, so it was considered correct to omit the tests of the repeaters in this study. The writer has a record of "relearners" which is considered separately.

A comparison of the two classes shows that at the end of the sixth week, (the week when the instructor who taught the High School class began keeping records) his average was 21.86 Gross words per minute, 17.05 Net words per minute and 4.81 Errors as compared with the writer's class of seven Senior High School students which showed 34.83 average Gross

words per minute; 28.50 average Net words per minute and 3.16 average Errors.

Even though the regular High School class had two hours of training per day, and the instructor emphasized accuracy and not speed, the students on the New Keyboard, with one hour of instruction daily averaged 3.16 errors and the students on the "universal" keyboard averaged 4.81 errors, per records at end of sixth week when the regular High School instructor began to record his tests. At the end of the ninth week the errors of the writer's group of seven High School students averaged 2.66 as compared with that of the class on the "universal" keyboard which averaged 3.63.

The records of the Senior High School students on the "universal" keyboard for the last week of school show an average of 30.11 Gross words per minute; 26.11 average Net words per minute and an average of 3.36 Errors. The records of the Senior High School students on the New Keyboard for the last week of school show an average of 44.33 Gross words per minute; 38.83 average Net words per minute; and an average of 2.66 Errors.

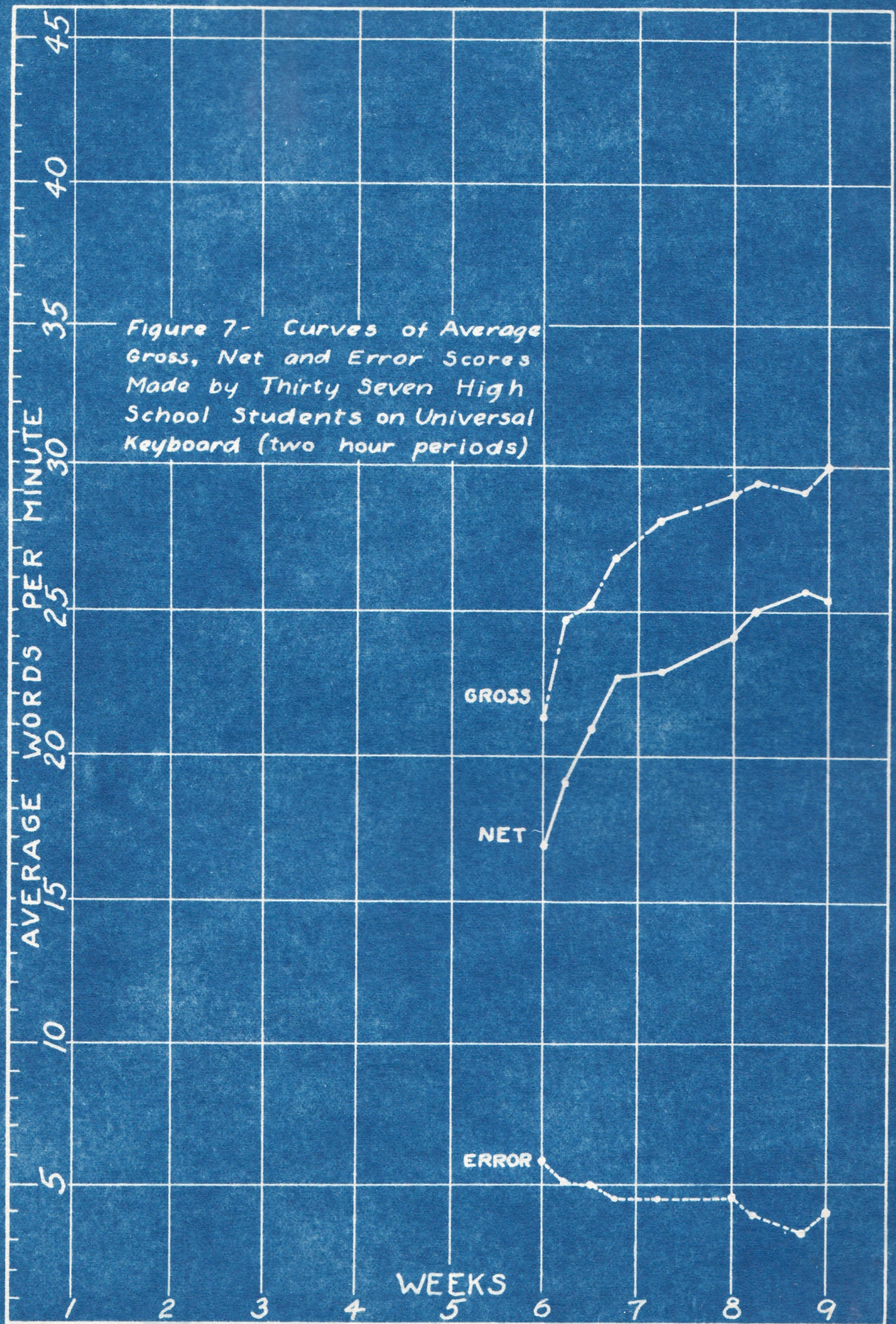
This direct comparison shows without a doubt the decided advantages of the New Keyboard over the "universal" keyboard, since both classes were conducted during the same summer, by experienced teachers, with students of the same chronological ages, the same interests, the same length of

time of courses, the same weather conditions, all of which have been mentioned before in this study. Those conditions which were unequal were favorable to the group using the "universal" keyboard. An example of unequal conditions favorable to the "universal" keyboard group was attendance which was compulsory in the High School classes and optional in the experimental classes. Thus, while the High School averaged practically perfect attendance for forty-five two hour periods, or ninety hours of instruction, the experimental group averaged thirty - eight one hour periods or thirty-eight hours of instruction.

It will be noted that Figure 7 shows only the last four weeks of school, but shows three tests recorded for each week. This figure shows the averages then of the last four weeks only. Neither the line showing the average Gross nor the line showing the average Net goes up as fast as the corresponding lines on Figure 4, the writer's Senior High School chart. Table V should be compared with Table II, the writer's table of students working on the NEW KEYBOARD. Figure 8 shows Figure 4 and 7 combined, giving a comparison of average Gross, Net and Error Scores made by seven Senior High School students on the New Keyboard, and thirty-seven Senior High School students on the "universal" keyboard.

Of the thirty-seven High School students who had ninety hours of instruction on "universal" keyboard during the summer of 1932, one reached forty or more net words per







AVERAGE GROSS NET AND ERROR SCORES MADE BY THIRTY-EIGHT SENIOR HIGH SCHOOL STUDENTS ON THE "UNIVERSAL" KEYBOARD IN THE LAST FOUR WEEKS OF SUMMER SCHOOL OF 1932

[illegible]





Figure 8 - A Comparison of Average Gross, Net and Error Scores Made by Seven Senior High School Students on New Keyboard and Thirty Seven Senior High School Students on Universal Keyboard

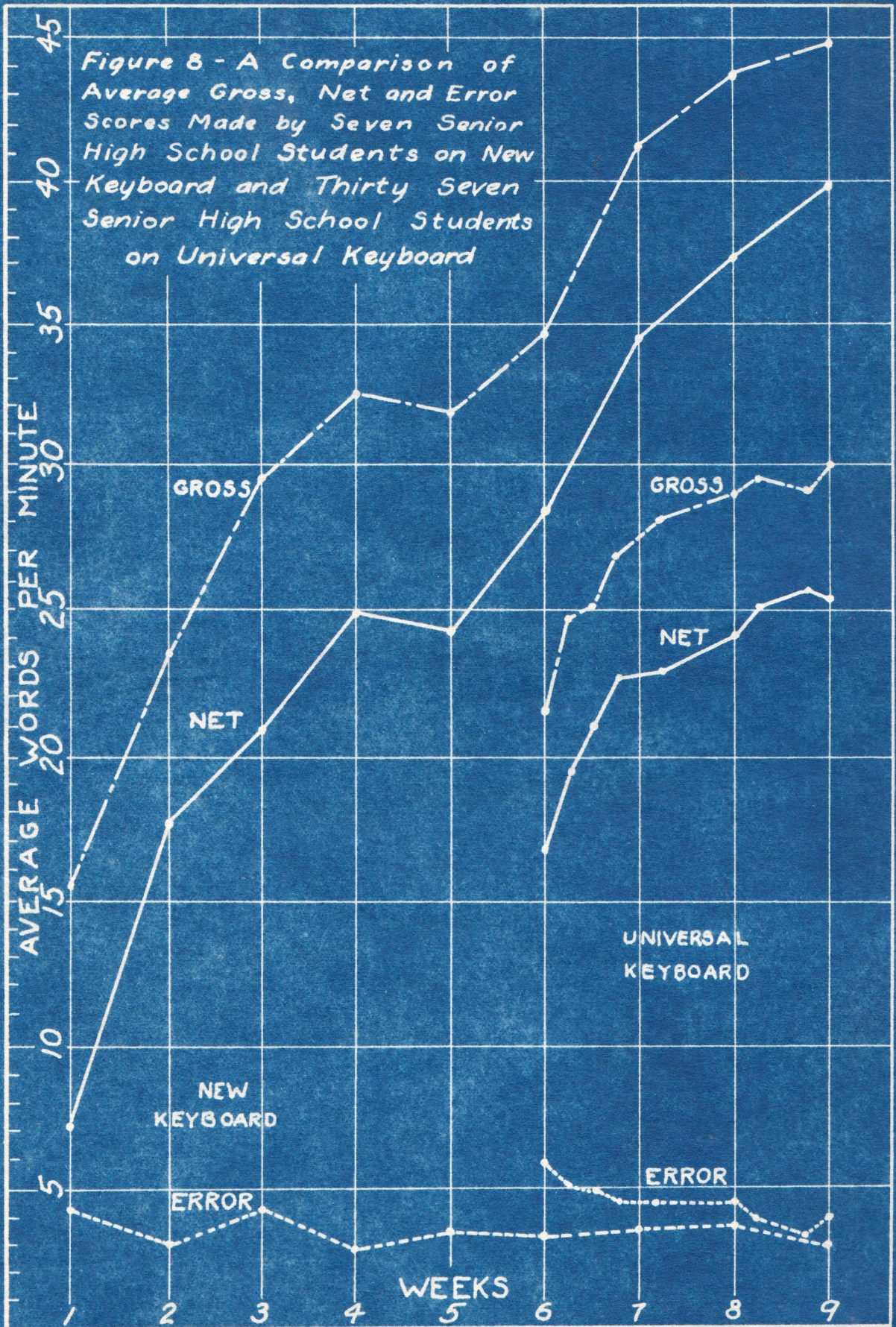




TABLE VI

AVERAGE AGE, DAYS PRESENT, AND NET WORDS PER MINUTE PER  
 HOUR OF PRACTICE FOR TWENTY-SIX JUNIOR HIGH SCHOOL  
 STUDENTS, SEVEN SENIOR HIGH SCHOOL STUDENTS,  
 TWELVE ADULTS AND FIVE RELEARNERS

	Average Age	Average Days Present	Average Attainment For Ninth Week			Average Net Words Per Minute Per Hour of Practice
			Gross	Net	Errors	
Twenty-Six Junior High School Students	14	24.0	35.25	28.00	3.37	1.17
Seven Senior High School Students	15	38.0	44.33	38.83	2.66	1.02
Twelve Adults	26	22.0	42.00	38.00	2.00	1.72
Five Relearners	23	39.8	66.66	59.33	3.66	1.49

minute, seven reached thirty or more net words per minute, sixteen reached twenty-five or more net words per minute, and twenty-six reached eighteen or more net words per minute. Of these thirty-seven Senior High School students twenty-six reached a passing attainment for ninety days, and seven reached a passing attainment for 180 days.

Of the thirty-three Senior and Junior High School students who had an average of thirty-one hours' instruction on the new keyboard, five reached forty or more net words per minute, ten reached thirty or more net words per minute, sixteen reached twenty-five or more net words per minute and twenty-one reached eighteen or more net words per minute. Of these thirty-three Senior and Junior High School students twenty-one reached passing attainment for ninety days and ten reached passing attainment for 180 days.

The record of these thirty-three Senior and Junior High School students also compare very favorably with the records of commercial students in 390 High Schools in the State of Iowa. Their records showed a Median of twenty net words per minute for Typing I, thirty-five Net words per minute for Typing II, forty-five net words per minute for Typing III, and fifty net words per minute for Typing IV. (1) This shows that five of the writer's thirty-three students, with thirty-one hours of instruction almost accomplished the Iowa requirement for Typing III.

1. Carmichael, Vernal H. "Objective Measurement of Accomplishment in Typewriting of High School Commercial Pupils in Indiana". Research Studies. Com'l Ed. V. E. G. Blackstone Editor. U. of Iowa studies in Ed. Monograph #12

## CHAPTER V. SUMMARY

A summary of the findings of this experiment is given in the following brief statements:

1. Typing was very successfully taught to Junior High School students. Fourteen out of twenty-six students made passing High School records for one semester in twenty-four hours of instruction. Five out of the twenty-six completed requirements for Typing II. This was accomplished in an average of twenty-four days' attendance as compared with the ninety days for one semester and 180 days for two semesters.

2. Typing was very successfully taught to Senior High School students. All seven made passing High School records for one semester in an average of thirty-eight hours of instruction. Five of the seven completed High School requirements for Typing II.

3. Typing was very successfully taught to Adults. Nine out of the twelve made passing High School records for one semester in an average of twenty-two hours of instruction. Six of the twelve completed High School requirements for Typing II.

4. It was easy for relearners to transfer from the old to the new keyboard as evidenced by average of 59.33 Net words per minute in 39.8 hours of instruction.

5. The new keyboard cuts down learning time required. Not so much of beginner's time is wasted in learning. It shortens the learning period to one-fourth or one-third the time required on the "universal" keyboard.

6. There has been a great need for "scientific" keyboard study since 1873.

7. Better stroking rhythm is possible on the new keyboard because it is based on the requirement for sequential stroking and uninterrupted flow of letters.

8. Greater ease in typing due to a more even distribution of loads among fingers of both hands.

9. Elimination of fatigue, due to wasteful hurdling in old machine was accomplished.

10. Faster students should be separated from the slower since they disturb the beginners.

11. Starting students on third and fourth finger and building up to the center of the hand is a desirable way of teaching typewriting. This is evidenced by the fact that this method did not hold back any students from making better records than were made by the regular High School group used for comparison.

12. The key arrangement makes it easy to learn and easy to remember the location of the keys.



13. There was an exceptionally low error average on one minute tests of .9897 errors per student.

14. Testing methods should be uniform from the first of the course, not changed from the typed copy to the printed, nor should any other changes have to be made.

15. Attendance in typing classes should be more regular than one ordinarily finds in summer school voluntary classes.

16. The new keyboard causes fewer typing errors than does the "universal" keyboard. Actual comparison between new and old keyboards showed an average of 3.16 errors for the new and an average of 4.81 errors for the old at the end of the sixth week. At the end of the ninth week there was an average of 2.66 errors for the new keyboard High School students and an average of 3.63 errors for High School students in regular High School group used as comparison.

## BIBLIOGRAPHY

Beardsley, Wm. H. Head of General Typewriter Exchange at Brooklyn, New York.

Beyerlin, A. "Typewriters in Germany". Topics May 1906.

Carmichael, Vernal H. "Objective Measurement of Accomplishment in Typewriting of High School Commercial Pupils in Indiana". Research Studies in Commercial Education V. E. G. Blackstone, Editor. University of Iowa. Studies in Education. Monograph # 12. University of Iowa, Iowa City. November 1932. pp 125-135.

Cushman, C. L. "Social Responsibilities of Commercial Education". Journal of Business Education. Vol. VIII. September 1932. No. 1. pp 9.

Funk & Wagnalls, New Standard Encyclopedia. Vol XXIV pp 119

History & Encyclopedia. Business Equipment Publishing Company. Reprint Edition from the October 1932 Issue of Typewriting Topics. The International Office Equipment Magazine. pp 10.

Leffingwell, Wm. H. The Office Appliance Manual. pp 346.

Mares, Geo. Carl. The History of the Typewriter. Guilbert Pitman. 85 Fleet Street. London pp 17-41

New International Encyclopedia. Vol XII. pp 595

Smith, Harold H. Diagnostic Testing and Remedial Teaching Part I. The Gregg Publishing Co. Journal of Business Education. Vol VIII. September 1932 pp 11.

Wood, B. D. "Does the Typewriter Stimulate Learning in the Elementary Schools?" School Management 1:8-10. September 1932.

APPENDIX I  
ADDITIONAL TESTS GIVEN STUDENTS ON NEW KEYBOARD

We all decided to go to a picture show rather than to go	56
and hear the man give a speech for we were too late to go	113
to the lecture. We left home about seven thirty. Just as	171
we arrived at the door of the show we met Bill. He said	227
that he would go to the show with us providing he could get	286
his pay check cashed. We told him we would let him have	342
some money until he could get to the bank. He seemed very	400
glad and went into the show with us. We saw a picture of	457
a cow and her calf. Since we had been raised on the farm it	517
recalled our childhood days to us. They seemed to fool around	578
all evening. We did not enjoy the show too much. We went	636
home and the next day Bill came over and brought us the	691
money we had let him have the night before.	734

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Test 5. Given Students from Fifth Week on for Motivation.

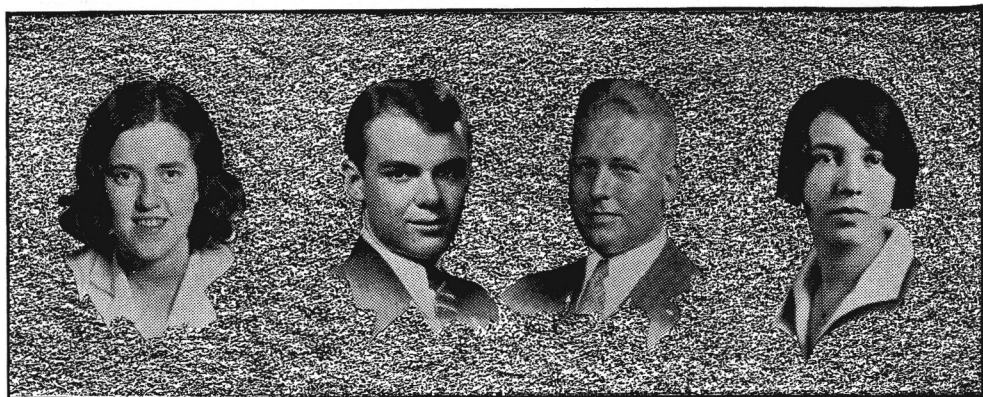
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The whole world loves a home. Mother likes boys and	52
girls in our home. They are all dear to her. She	102
likes good books in our home, too. She is happy	150
when home is a place of love and rest. Did you ever	202
think that half of your life is spent at home? Value	255
your friends above money and open your home to them	306
at least every few weeks. It will not matter in	354
making them happy whether your home is small or	401
large, if kindly feeling is everywhere present	447
while they are there. They will thank you again and again.	506

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Test 6. Given Students From Fifth Week on for Motivation.

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FLORENCE BELL

CHESTER SOUCEK

GEORGE L. HOSSFELD

BELVA KIBLER

## UNDERWOOD EXPERT TYPING TEST February, 1930

¶ To qualify for Underwood Awards this test must be written without practice and submitted during the current month.

It is often a matter of wonderment to me whether or not we young people have any just conception of the value of the things scattered about us on every hand. A little while ago I was walking on Broadway and passed a shoe shop in the window of which I saw a pair of shoes. They seemed to be nice shoes although not just what I, myself, would be apt to buy. I am no real expert when it comes to such matters but the price tag, thirteen dollars and a half, aided me in forming an opinion of their worthiness. At any rate, it seems to me that a fairly good pair of shoes ought to be had for that amount of money.

And then my mind went back to something I was reading only yesterday. It was a pencilled list of the things my great-great-grandmother brought as her share of the partnership on the day she was married. Pots, pans, kettles, sheets, and in fact, the complete outfit was given, and against each was set the price at which it was valued, or that had been paid for it, and the items were correctly added at the bottom of the list, the sum being exactly thirteen dollars and a half, the price that was tagged on the pair of shoes I have spoken about. Funny, isn't it? I do not believe that young people like you and me pay

*Strokes*

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279  
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393  
451  
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665  
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779  
836  
898  
956  
1012  
1067  
1125  
1183  
1238

as much attention to such things as we should. The price we pay for a wrap or a suit of clothes would have bought a farm for my ancestors, and have left enough for a cow or two and a few chickens.

But there is another queer turn in the story. In the list I have named above was a foot-warmer, a little tin box in which glowing charcoal was carried to church to warm the toes of the pious worshippers. I think it was valued at something like a half-dollar, but if I had it now I could sell it, battered and worn, for as many dollars as it originally cost cents. And after a while the pair I referred to got together cash enough to send to England and purchase the works of a clock, and after they came to hand a cabinet maker fashioned a case for them, one of those tall, six-foot cases they had in those days, and all at a cost of not more than ten dollars. That same clock now stands in my hall and if I chose I could sell it for a few hundred dollars to Henry Ford, maybe.

And again I wonder if we get any more fun going to a fashionable shop and buying the things which they had to make for themselves. I am rather inclined to think we do not. If we want a pen we buy a self-filler at an unreasonable price, and spill the ink all over our white vests or flannel skirts. They did not do that. They sent the oldest boy out into the barnyard to catch a goose and hold it up for one of its quills, then with a knife (that's where you get the term pen knife) they whittled the point of that feather and proceeded to write with it, and sprinkled sand on the writing so that it would not blot.

And I have the plate my respected far-off grandmother used to eat from. Crockery of all kinds was costly in those days, or so they believed, and naturally, they turned their inventive faculties toward some substitute. In this case the material was wood, and the plate I speak of was turned from a block of wood until it was as thin as a piece of china. I would like to see our wood workers try to dupli-



cate it. Finally it got broken clear across the center, but it was worth too much to throw away, and so the edges were fastened together with pieces of wire and dinner was served as usual.

The husband was a cabinet maker, and a good one, and he carried the trade so far as to build his own house, getting the money for the material from the wage of a dollar and a half a day he received when working for other people, although much of the lumber he hewed from trees which grew on his own little farm. And when the house was finished he made the furniture for it, and I think the old lady's eyes would open wide if I could tell her that the table he fashioned for her out of fine mahogany now stands in my room and dealers would pay for it as much as her house cost originally.

Now and then I hear some old codger refer to the "good old days" but to young people like ourselves it always brings up a big question mark—were they so good, and still again are ours any better? They lived long. I have seen the stone marking their burial place and the man, at least, was over a hundred years old when he passed on to his deserved rest. They saw their descendants down to the fourth generation, come and go. They fought out the battle of life just as we have to do, and I believe came out victors. They were rigid Puritans and "eschewed the Devil and all his works," or thought they did, which was just as well. They laid the foundation upon which we have builded, and without that foundation we could have accomplished little. They lived and they died, and have become only a memory or a tradition, a small atom in the life of the years that have become known as "the good old days." The best we can do is to imitate their virtues and live close to the standard of probity and honor that they set up.

*(Start from the beginning if completed in less than fifteen minutes)*

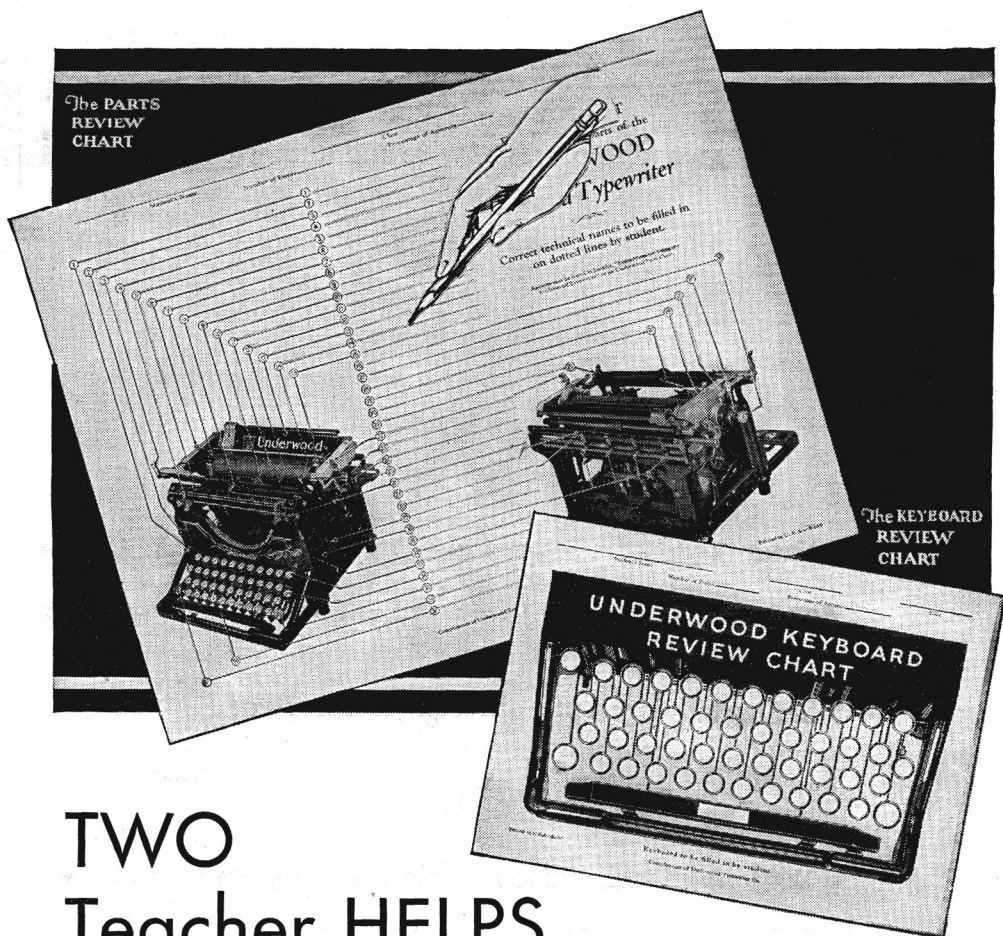
"The Good Old Days," by J. N. Kimball.

Strokes

3309  
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3717  
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4473  
4533  
4591  
4648  
4703  
4757  
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4869  
4925  
4981  
5041  
5058

SCALE FOR COUNTING TYPEWRITING STROKES

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76



## TWO Teacher HELPS

UNDERWOOD Parts Review Charts and Keyboard Review Charts are designed to stimulate interest in typewriting and to aid Teachers in their efforts to secure the best possible results in the classroom.

These teacher-helps will be sent to any Teacher, upon request, as a part of Underwood Educational Service to Schools.

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# UNDERWOOD

THE MACHINE OF CHAMPIONS

## APPENDIX II

TYPE OF MATERIAL USED FOR TESTING STUDENTS ON NEW  
KEYBOARD DURING THE FIFTH, SIXTH, SEVENTH, EIGHTH  
AND NINTH WEEKS OF EXPERIMENTAL COURSE.

Other tests given from fifth week on were;

Woodstock Typewriter Test and Practice Matter,  
November, 1931

Remington Awards Test, June 1927

L. C. Smith & Corona Typewriter Award Test for  
Typing, March, 1930

Royal Awards Test, June 1926, and many others  
of this same type.